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USING FERTILIZER MACHINERY FOR ADDING SODIUM METABISULFITE TO GRASS SILAGE

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The addition of acid to ensiled grassland crops having a high moisture content (72-85%) has been used as a means for improving the odor, carotene content and, to some extent, the efficiency of preservation of the resulting silage. Acids in a liquid or gaseous form have been most commonly used. However, such acid materials may be hazardous, expensive or inconvenient. A dry chemical which will form a suitable acid upon contact with the natural moisture of the forage has some advantages when compared to liquid and gaseous chemicals. Sodium metabisulfite is such a chemical which has been used to a limited extent as a silage conditioner. Other chemicals in dry form may also prove useful for this purpose.

A mechanical method for uniform application of dry chemicals to silage is necessary to realize maximum benefits of use. Excessive applications are wasteful and may produce unpalatable silage, whereas too low a rate may produce little or none of the desired effect on the silage. Fertilizer hoppers from planters and drills may be adapted for addition of dry chemicals to silage at the blower or elevator as the silo is filled. Until equipment is commercially available, the following discussion may be of aid in selecting and adapting fertilizer hoppers to add sodium metabisulfite to silage.

Equipment Required

Approximately eight pounds of sodium metabisulfite should be added to each ton of silage. If silage is being stored at a rate of 8 tons per hour of blower operation, then 64 pounds of sodium metabisulfite would be required per hour or about 1 pound per minute. Any of the numerous types of fertilizer hoppers may be used; however, a hopper that was made to dispense small quantities is most desirable. A small size hopper is most often used to dispense small quantities of material.

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DETERMINING SPEED OF THE HOPPER SHAFT

Most fertilizer hoppers operate from a horizontal shaft running under the hopper. To determine the speed this shaft should turn, actual test must be made by using sodium metabisulfite. However, in order to first get the hopper set up for actual tests, an approximate speed may be used. Two common types of hoppers that have been tested with sodium metabisulfite are the star wheel type and revolving pan type (See Fig. 1). With the revolving pan type hopper, which was 10 inches in diameter, shaft speeds of from 30 to 120 revolutions per minute were satisfactory. With a 6-inch star wheel in a 10-inch hopper, 10 revolutions per minute were satisfactory.

Next, provide a drive mechanism which will turn the shaft of the hopper being used at the approximated speed. The hopper can be driven by (1) an electric motor, approximately 1/4 HP, with two counter shafts or speed reducers, (2) sprockets or belt to blower feed table drive, (3) mechanical connection to some types of wagon unloaders, (4) small gasoline engine (1 H.P.) and speed reducer assembly or (5) hand crank attachment.

CAUTION:

BE SURE TO MOUNT THE HOPPER HIGH ENOUGH SO THAT MATERIAL WILL FALL EASILY INTO THE BLOWER. ALL EQUIPMENT SHOULD BE MOUNTED SECURELY TO AVOID ANY POSSIBILITY OF PARTS OR EQUIPMENT FALLING INTO THE BLOWER.

When the drive mechanism and hopper are assembled, run the unit for a test at the speed which will be used when adding chemical to the silage. Put a pan or bucket, previously weighed, under the spout of the hopper and collect the flow from the hopper spout for 2 or 3 minutes. Weigh the collected material and bucket, and subtract the weight of the bucket or pan. Divide by the number of minutes to get pounds per minute. If the rate of flow cannot be reduced to 1 pound per minute by closing the adjustable hopper opening, then the hopper shaft speed must be reduced.

The desired actual rate of flow of sodium metabisulfite may not be exactly 1 pound per minute. This rate of flow will depend upon the speed at which the silage is being unloaded. Eight pounds of sodium metabisulfite should be added to each ton of silage. To be accurate, it is necessary to weigh both the silage and the sodium metabisulfite. If possible, weigh an average load of silage. However, estimation of silage weights can be made by measuring size of load in wagon or truck.

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One hundred cubic feet of silage will weigh approximately one ton. To find the number of cubic feet in a wagon or truck, multiply the width in feet times the length in feet times the average depth of load in feet. A wagon body 7 feet wide and 12 feet long with silage 3 feet deep will contain 252 cubic feet or about 2 1/2 tons of silage. Unloading three loads this size in an hour of continuous running would be about 7 1/2 tons per hour which would require about 1 pound per minute of sodium metabisulfite.

After unloading the first load, closer adjustments should be made. If it is found that the silage is being unloaded at the rate of 12 tons per hour of continuous running, then a flow rate of about 1 1/2 pounds per minute of sodium metabisulfite would be required. On the other hand, if the silage was being unloaded at the rate of 4 tons per hour of continuous running, then a flow rate of about 1/2 pound per minute of sodium metabisulfite would be required.

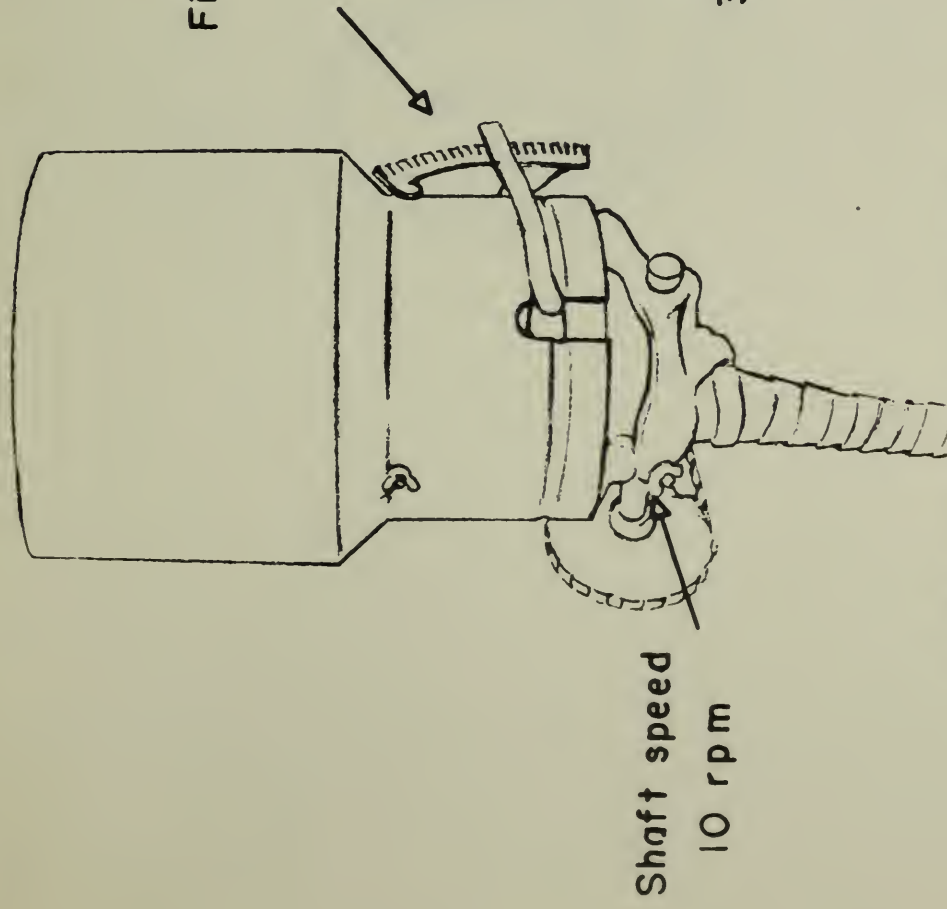
If more or less sodium metabisulfite is required per minute change the adjustable hopper opening. When this opening is changed from the setting made on the first test, another test should be made by collecting sodium metabisulfite and weighing it as outlined above.

CAUTION:

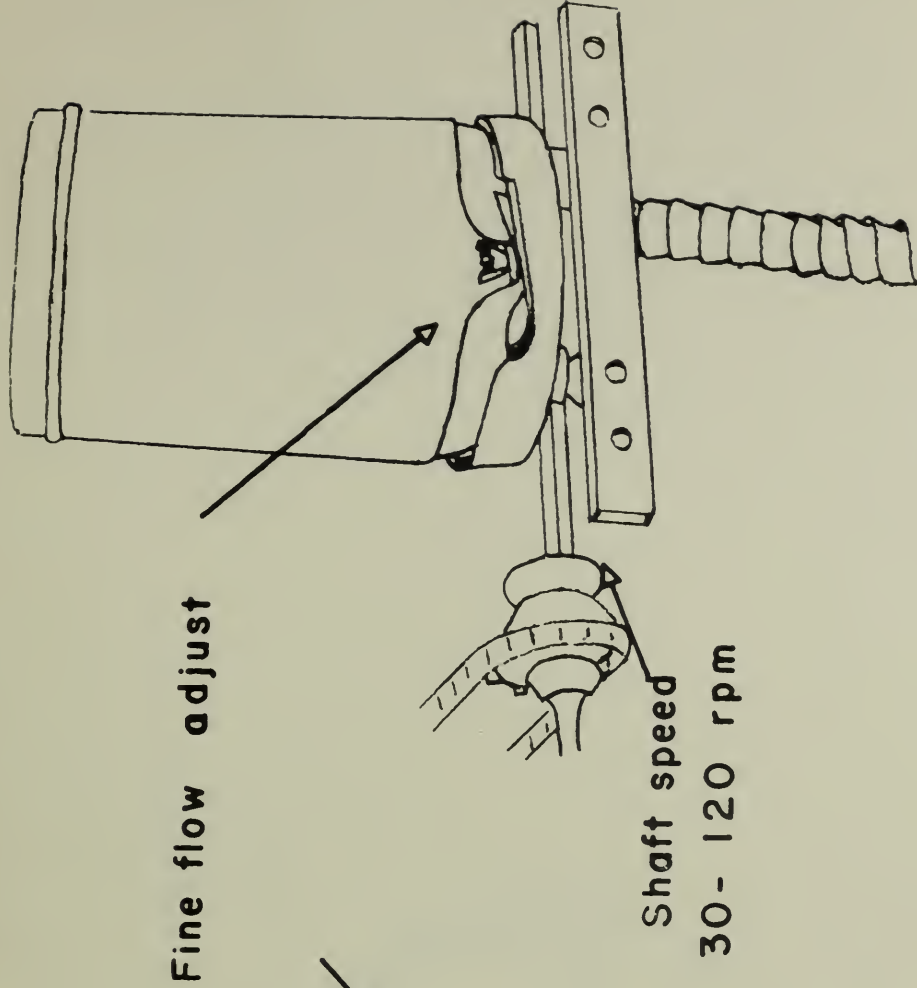
EMPTY AND CLEAN HOPPER AFTER EACH DAY'S OPERATION TO AVOID RUST AND CORROSION OF HOPPER. FINAL DAILY CLEANING OF EMPTY HOPPER BY WASHING WITH WATER IS A CONVENIENT METHOD. KEEP SODIUM METABISULFITE IN A DRY PLACE.

This method of adding dry materials to silage can be used for other dry chemicals or corn and cob meal; however, larger hoppers and faster feed rates may be necessary.

FIG. 1 TWO TYPES OF FERTILIZER HOPPERS



STAR WHEEL TYPE



REVOLVING PAN TYPE

